A Telecommunications Market Analysis: Uses, Needs, and Wants

Prepared for

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City of Lynchburg, Virginia

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The City of Lynchburg and the Lynchburg Public Schools have constructed, and are now using, a state-of-the-art fiber optics based telecommunications system. The City and the school system constructed and now operate their own system because, after much study, this approach was determined to be the quickest and most cost effective way to meet immediate needs and wants.

The system was deliberately over built so that others might also use it. Who these "others" might be and what their relationship to the City and schools might be is yet to be determined. The City is moving toward answers to these and other questions about the future of telecommunications within the City and region. This market analysis was commissioned to aid in this decision making process. Who are the additional potential users of an expanded telecommunications system? How are their current needs met? What are their current and near future needs and wants? In the spring of 1998 the City of Lynchburg contracted with Thomas W. Seaman, Ph.D. to plan and conduct a market analysis. Dr. Seaman is the Director of the Center for Community Development at Lynchburg College and a long time resident of the area.

The market analysis involved four distinct steps. First, relying on secondary data, selected demographics of the City and surrounding metropolitan area were gathered and summarized. Demographics were selected that may have some relevance to telecommunications and potential partners in an expanded system. Second, a series of surveys were conducted focusing on the telecommunications use, needs, and wants of various sectors of the City's population. The surveyed sectors were businesses, teachers, physicians, health care institutions, and heads of households. The goal was to develop quantitative market indicators. Third, a series of focus groups were conducted to explore ideas, knowledge, and enthusiasm among representatives from business, education, health care, and households. Fourth, a number of face-to-face interviews were held with representatives from local government, business, and educational institutions who are major potential users of an expanded telecommunications system. The purpose of the interviews was to gather information about the needs and wants of the institutions, to give them a personal briefing on the status of the system, and to generate enthusiasm for an expanded system.

II. The Market Analysis Summary

A. Area Demographics

The City of Lynchburg is the urban center of Central Virginia. Located on the James River approximately 180 miles southwest of Washington DC, the City has a long history as a transportation and manufacturing center. The City's location made it a railroad hub for both east/west and north/south routes. In the 20th century the long distance telephone lines followed the railroad right-of-ways. These historical processes now have 21st century telecommunications implications. Lynchburg has four points-of-presence (POPS) from major long distance providers --- unique for a City of this size.

Here are some of the key demographic characteristics of the City and region.

- The City is home to approximately 68,000 residents with the entire metropolitan Statistical Area (MSA) containing approximately 210,000.

- There are 27,233 housing units within the City and an additional 56,860 in the MSA.

- Publications like Money routinely rank Lynchburg among the most desirable places to live in the south.

B. The Government Sector

Lynchburg is an independent city with a manager-council form of government. The mayor is elected by the full council. In a recently adapted vision statement for the 21st century, the City leaders have pledged themselves to provide "a comprehensive communication infrastructure for linking community institutions, including schools, colleges, hospitals, businesses and government agencies, and households into one powerful network." The City and its leaders are clearly taking a proactive approach to making the vision a reality and leading the way within the region.

The surrounding counties --- Amherst, Campbell, Bedford, and Appomattox --- have boards of supervisors which elect a chair and usually employ a county administrator. The leadership within the counties are being kept informed on the progress of the City's telecommunications system and are informally expressing interest.

C. The Business Sector

The Greater Lynchburg Chamber of Commerce membership includes nearly 1,000 companies ranging dramatically in size and type of business. While the service sector accounts for 26% of the labor force, 22% are employed in manufacturing. Manufacturing ranges from traditional "smoke stack" industries like Griffin Pipe to high tech companies life Framatome Technologies. The economic structure of the City and region is diversified and strong. A recent survey of human resource officers described the labor force as exhibiting an extremely high work ethic and commitment to traditional values.

- 81% of businesses currently have Internet access; it is expected to grow to 98% within 2-5 years.

- 61% of businesses currently have Web sites; it is expected to grow to 64% within 2-5 years.

- 65% of businesses currently use electronic data transfer; it is expected to grow to 69% within 2-5 years.

- 20% of businesses currently use videoconferencing; it is expected to grow to 39% within 2-5 years.

- 43% of businesses currently use remote access computing; it is expected to grow to 46% within 2-5 years.

- Conclusion -- Lynchburg's businesses are moving ahead in the uses of telecommunications but there is room for substantial expansion and the companies expect to expand.

- When asked about level of satisfaction with the quality of current telecommunications services, no service was singled out for significant dissatisfaction although paging, cellular phone, and Internet services were rated lower than others.

- When asked about level of satisfaction with the cost of current telecommunications services,

there was much less satisfaction toward all types of services.

- When asked if they would consider changing to another service provider supplying comparable service at less cost**,** the response was a clear "Yes" --- the greater the reduction in cost, the greater willingness to consider change.

- When asked what criteria were most important in telecommunications services, quality and reliability of service ranked highest. While important, the technical and cost criteria ranked as less important.

- Focus groups and interview discussions revealed:

  Significant enthusiasm for an expanded Central Virginia telecommunications system.
  An openness to consider nontraditional sources of services.
  Enthusiasm over the possibility of competition in areas where it does not now exist.

D. The Education Sector

Lynchburg is a city rich in outstanding educational institutions at every level -- K - 12, two and four year colleges, and graduate programs. The public schools include twelve elementary schools, three middle schools, two comprehensive high schools, and an assortment of special schools and programs for selected groups of students. The public schools employ nearly 750 classroom teachers. This system which serves 9,500 students is regularly ranked among the best in the state and nation. The public school system is currently served by the City's fiber optics system.

Expanded uses in the near future include but are not limited to individual school web sites that will include a wide array of information and materials and distance learning between schools to allow small enrollment classes to be offered in different schools at the same time.

In addition to the public system, K - 12 students are served at two parochial schools -- Holy Cross Regional School and Lynchburg Christian Academy . Two residential middle/senior high schools are also located within the City and serve students from the City as well as across the state and nation --- Virginia Episcopal School and The Virginia School for the Arts. None of these schools are currently served by the fiber optics system and all are potential users.

The higher education community within the City of Lynchburg includes Central Virginia Community College, Lynchburg College, Randolph Macon Women's College, Liberty University, and Virginia University of Lynchburg. In addition, a number of colleges and universities located else where offer courses within Lynchburg including the University of Virginia, Old Dominion University, and Averett College.

As would be expected, the higher education community is currently a major user of telecommunications technology and their utilization is expected to increase dramatically in the years ahead. None of these institutions are served by the City's telecommunications system requiring each to seek and maintain their own arrangements.

To measure the knowledge and use of telecommunications among the City of Lynchburg public school teachers and their enthusiasm for modern telecommunications, a survey of teachers was conducted in the summer of 1998. A questionnaire was distributed through the schools to all of the approximately 750 teachers. Participation in the survey was, of course, voluntary and produced 416 responses --- a return rate of over 55%. The responses proportionately represent K-12 teachers, all subjects, and all levels of teaching experience. Below is a summary of the results of that survey.

- 94.5% of the teachers were aware of the construction of the fiber optics telecommunications system.
- 94% indicated that they will make use of a networked system that connects homes, school, government offices, the Web, etc.
- 95% reported that they already have classroom access to a personal computer. (The remaining 5% are teachers without permanent classrooms such as art teachers)
- 96.4% reported that they already make use of the personal computer as a teaching aid or to prepare for class.
- 91% indicated that their classroom PC was connected to the Internet.
- 84% reported that they have access to a PC in their home.
- 77.5% of those with home computers have a modem.
- 64% reported subscribing to an Internet service.

The teachers were asked to anticipate and list the educational advantages of an expanded telecommunications system that links homes and classroom. The most frequent responses were:

- easier, quicker, and more frequent communication between teacher and parent
- homework and project assignments could be made on-line
- greater access to the internet for student projects and research
- teachers could communicate and share ideas more easily

The above assessment of the Lynchburg educational community reveals wide spread interest in, use of, and enthusiasm for modern telecommunications. Decision makers in both the public and private educational arenas have committed many millions of dollars to bring, and keep, area education at the frontier of educational telecommunications. The teacher survey clearly indicates that this involvement and enthusiasm is not limited to a small number of teachers or administrators but is pervasive throughout the educational community. With this level of commitment, involvement, and enthusiasm, telecommunications has a bright future in the City of Lynchburg.

E. Health Care Sector

The quality and breadth of health care within Lynchburg and its MSA are ranked among the best in the State. One often cited reason is that physicians are attracted by the quality of life within the region and once here choose to stay. The hub of the health care industry is Centra Health, a nonprofit, locally owned and managed corporation. Centra Health has become one of the major employers within the region and, as might be expected, one of the largest potential users of an expanded telecommunications system.

To assess health care telecommunications uses, needs, and wants questionnaires were mailed to a sample of 155 physicians (59 were returned for a response rate of 38%) and 13 nursing homes (7 were returned for a response rate of 54%) Centra Health was not included in the survey. In addition, a health care focus group was held. The following data were derived from those sources.

- health care professionals are currently light to moderate users of available

telecommunications but expect to significantly increase use in the next 2-5 years.

- When asked about the quality of current telecommunications services, paging, cellular, and Internet service got the lowest ratings.

- When asked about the cost of current telecommunications services, there was a general expression of moderate dissatisfaction.

- When asked if they would consider changing to another service provider supplying comparable service at less cost**,** the response was a clear "Yes" --- the greater the reduction in cost, the greater willingness to consider change.

- As was the case in the business sector, quality and reliability of service are the most important criteria when evaluating telecommunication providers.

- Focus group participants indicated that physicians and other health care professionals were not as informed about state-of-the-art telecommunications as the public might think. For physicians, like the rest of us, change is difficult.

- Focus group discussion of questionnaire comments suggest significant enthusiasm for and a willingness to participate in an expanded telecommunications system.

F. The Household Sector

There are more than 27,000 families within the City and another 57,000 in the MSA --- a sizeable market for services if heads-of-households are ready, willing, and able. To assess the household market a random sample of 2**,**000 utility customers within the City was selected and surveyed. Six hundred questionnaires were returned for a response rate of 30% --- a remarkably high return rate for a cross-sectional sample of a general population. This high rate of return coupled with questionnaire comments and focus group discussion can be interpreted as an expression of strong interest and support for an expanded telecommunications system. More than 100 families volunteered to serve on focus groups or committees.

The highlights below were derived from survey and focus group data.

- 88% of households currently subscribe to the cable TV service.

- 50% of households have Internet service and the number is expected to reach 62% within 2-5 years.

- 56% of households currently subscribe to a cellular phone service.

- Only 14% of households currently use on-line banking but 31% expect to within 2-5 years.

- When asked about satisfaction with the quality of services, heads-of-households expressed the greatest dissatisfaction with cable TV, followed by Internet service**.**

- When asked about satisfaction with the cost of services, heads-of-households expressed a general dissatisfaction with cable TV leading the list.

- When asked if they would consider changing to another service provider supplying comparable service at less cost**,** the response was a clear "Yes" --- the greater the reduction in cost, the greater willingness to consider change.

- When asked if they would consider switching to nontraditional service providers only 9% said "No" to cable service, 28% said "No" to local phone service, and 18% said "No" to Internet service.

- As was the case in all other sectors of the City, quality and reliability were ranked as the most important characteristic of telecommunications services --- technical and cost issues are less important.

- Of all the focus groups held, the heads-of-households expressed the greatest enthusiasm. There was every indication that when it comes to home applications of telecommunications, Lynchburg's homes are ready and willing.

III. Conclusions

Perhaps because of the strength of the educational sector, perhaps because of the concentration of manufacturing companies (many who do business internationally), or perhaps because of forward looking and innovative government leadership, the City of Lynchburg is a community that knows what it wants in telecommunications as it enters the new century. The City leadership in government and education, with the support of all sectors of the community, has assumed a proactive stance toward the City's telecommunications future.

The City and region are strong educationally, economically, and in health care and offer a quality of life difficult to match any where in the nation. Already out in front of most similar communities in telecommunications, the City has a market that wants and will support more.

A Telecommunications Market Analysis: Uses, Needs, and Wants

I. The Process

The City of Lynchburg and the Lynchburg Public Schools have constructed and are now using a state-of-the-art fiber optics based telecommunications system. The City and the school system constructed and now operate their own system because, after much study, this approach was determined to be the quickest and most cost effective way to meet immediate and long term needs and wants.

The system was deliberately over built so that others might also use it. Who these "others" might be and what their relationship to the City and schools might be is yet to be determined. The City is moving toward answers to these and other questions about the future of telecommunications within the City and region. This market analysis was commissioned to aid in this decision making process. Who are the additional potential users of an expanded telecommunications system? How are their current needs met? What are their current and near future needs and wants? In the spring of 1998 the City of Lynchburg contracted with Thomas W. Seaman, Ph.D. to plan and conduct a market analysis. Dr. Seaman is the Director of the Center for Community Development at Lynchburg College and a long time resident of the area.

The market analysis involved four distinct steps. First, relying on secondary data, selected demographics of the City and surrounding metropolitan area were gathered and summarized. Demographics were selected that may have some relevance to telecommunications and potential partners in an expanded system. Second, a series of surveys were conducted focusing on the telecommunications use, needs, and wants of various sectors of the City's population. The surveyed sectors were businesses, teachers, physicians, health care institutions, and heads of households. The goal was to develop quantitative market indicators. A sample of one of the survey questionnaires may be found in the Appendix of this report. Third, a series of focus groups were conducted to explore ideas, knowledge, and enthusiasm among representatives from business, education, health care, and households. Fourth, a number of face-to-face interviews were held with representatives from local government, business, and educational institutions who are major potential users of an expanded telecommunications system. The purpose of the interviews was to gather information about the needs and wants of the institutions, to give them a personal briefing on the status of the system, and to generate enthusiasm for an expanded system.

II. The Market Analysis

Presented below are the results of the above process. The market study assumes and the organization of this report reflects the belief that different sectors of the community have different interests in, knowledge of, and uses for -- current and future -- telecommunications. At the same time it should not be overlooked that dividing a community into sectors is to some extent artificial and perhaps misleading. Communities are highly integrated entities --- business

men and women are also heads-of-households, teachers are also consumers of health care services, physicians are also voters, and so on.

A. Area Demographics

The City of Lynchburg is the urban center of Central Virginia. Located in the geographic center of the state on the James River approximately 180 miles southwest of Washington DC, the City has a long history as a transportation and manufacturing center. The City's location made it a railroad hub for both east/west and north/south routes. In the 20th century the long distance telephone lines followed the railroad right-of-ways. These historical processes now have 21st century telecommunications implications. Lynchburg has four points-of-presence (POPS) from major long distance providers --- unique for a City this size.

Here are some of the key demographic characteristics of the City and region.

- The City is home to approximately 68,000 residents with the entire metropolitan Statistical Area (MSA) containing approximately 210,000.
- There are 27,233 housing units within the City and an additional 56,860 in the MSA.
- The median household income within the City is $23,726.
- The current unemployment rate is 3.1%.
- The service sector employs 26% of the labor force followed by manufacturing at 22%.
- Major private sector employers within the MSA are Ericsson, BXT Technologies, J Crew Outfitters, RR Donnelley and Sons, Griffin Pipe, Rubatex, Ross Products, Lane Furniture, Framatome Technologies, First Colony Life Insurance (recently purchased by General Electric Financial Assurance.)
- Median sales price for an executive quality, 2,200 sq. ft. house is $136,527.
- Publications like Money routinely rank Lynchburg among the most desirable places to live in the south.

B. The Government Sector

Lynchburg is an independent city with a manager-council form of government. The mayor is elected by the full council. In a recently adapted vision statement for the 21st century, the City leaders have pledged themselves to provide "a comprehensive communication infrastructure for linking community institutions, including schools, colleges, hospitals, businesses and government agencies, and households into one powerful network." The City and its leaders are clearly taking a proactive approach to making the vision a reality and leading the

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The Greater Lynchburg Chamber of Commerce membership includes nearly 1,000 companies ranging dramatically in size and type of business. While the service sector accounts for 26% of the labor force, 22% are employed in manufacturing. Manufacturing ranges from traditional "smoke stack**"** industries like Griffin Pipe to high tech companies life Framatome Technologies. The economic structure of the City and region is diversified and strong. A recent survey of human resource officers described the labor force as exhibiting an extremely high work ethic and commitment to traditional values.

The market analysis survey mailed questionnaires to a randomly selected sample of 200 small to medium companies within the City. Sixty-four questionnaires were returned for a response rate of 32%. In addition to the survey, the business market was observed with focus groups and one-on-one interviews with major potential users of a telecommunications system.

Table I - **The Business Market: Current and Near Future Uses, Needs, and Wants** presents the business community's current and expected use of a wide range of telecommunications services. Some of the key findings are highlighted with bullets.

- 81% of businesses currently have Internet access; it is expected to grow to 98% within 2-5 years.
- 30% of businesses currently use on-line banking; it is expected to grow to 43% within 2-5 years.
- 72% of businesses currently have 800 phone service; it is expected to decline to 68% within 2-5 years.
- 61% of businesses currently have Web sites; it is expected to grow to 64% within 2-5 years.
- 65% of businesses currently use electronic data transfer; it is expected to grow to 69% within 2-5 years.
- 20% of businesses currently use videoconferencing; it is expected to grow to 39% within

2-5 years.

- 43% of businesses currently use remote access computing; it is expected to grow to 46% within 2-5 years.

- Conclusion -- Lynchburg's businesses are moving ahead in the uses of telecommunications but there is room for substantial expansion and the companies expect to expand.

Table I

The Business Market*
Current and Near Future Uses, Needs, and Wants

Services	Currently Use		Expect to Use In 2 - 5 Years
Local telephone	100%		100%
Cable TV Service	41%		34%
Cellular phone service	75%		78%
Internet access service	81%		89%
Internet on TV	9%		7%
Fax service	100%		97%
E-mail service	78%		88%
On-line banking	30%		43%
On-line shopping	11%		14%
Voice mail	62%		71%
A paging service	67%		63%
Satellite TV service	23%		28%
800 phone service	72%		68%
Telecommuting	33%		29%
Distance learning	15%		18%
Distance job training	23%		29%
Alarm/Security monitors	71%		71%
Company web sites	61%		64%
Data transfer	65%		69%
Local area network	60%		62%
File transfer	55%		53%
Videoconferencing	20%		39%
Remote access computing	43%		46%
Phone banks	11%		11%

*Based on data collected in the Summer of 1998

Table II - **The Business Market: Level of Satisfaction with the Quality of Service of Current Providers** indicated that no service was singled out for significant dissatisfaction although paging, cellular phone, and Internet services were rated lower than others.

The Business Market*
Level of Satisfaction with the Quality of Service of Current Providers

Type of Service	Level of Satisfaction: Satisfied 1	2	3	4	5	6	Dissatisfied 7	N/A
Local phone service	45%	25%	17%	11%	0%	0%	2%	0%
Long distance phone ser	44%	27%	11%	11%	0%	0%	2%	0%
Cellular phone service	20%	17%	20%	11%	3%	3%	0%	25%
Paging service	17%	25%	10%	14%	6%	0%	0%	29%
Satellite service	11%	4%	4%	2%	2%	0%	0%	78%
Cable TV service	5%	7%	4%	11%	7%	4%	4%	60%
Internet service	13%	33%	15%	10%	2%	2%	0%	25%
Leased point-to-point line	9%	7%	0%	4%	2%	0%	0%	78%

*Based on data collected in the Summer of 1998

Table II

Table III - **The Business Market: Level of Satisfaction with the Cost of Service of Current Providers** indicates that there was much less satisfaction toward all types of services.

The Business Market*
Level of Satisfaction with Cost of Service of Current Providers

Type of Service	Level of Satisfaction: Satisfied 1	2	3	4	5	6	Dissatisfied 7	N/A
Local phone service	17%	31%	22%	12%	3%	6%	6%	2%
Long distance phone service	23%	31%	22%	12%	5%	3%	2%	2%
Cellular phone service	10%	17%	18%	15%	8%	2%	5%	25%
Paging service	12%	21%	22%	12%	2%	0%	2%	29%
Satellite service	4%	6%	6%	4%	0%	2%	2%	78%
Cable TV service	5%	2%	2%	10%	7%	5%	7%	61%
Internet service	14%	17%	21%	9%	2%	2%	2%	24%
Leased point-to-point lines	2%	5%	2%	4%	5%	2%	4%	76%

*Based on data collected in the Summer of 1998

Table III

Graph I - **The Business Market: Current Long Distance Providers** clearly indicates that AT&T has the lion's share of the long distance phone business with 51%, the others share the remaining 49%.

Graph I

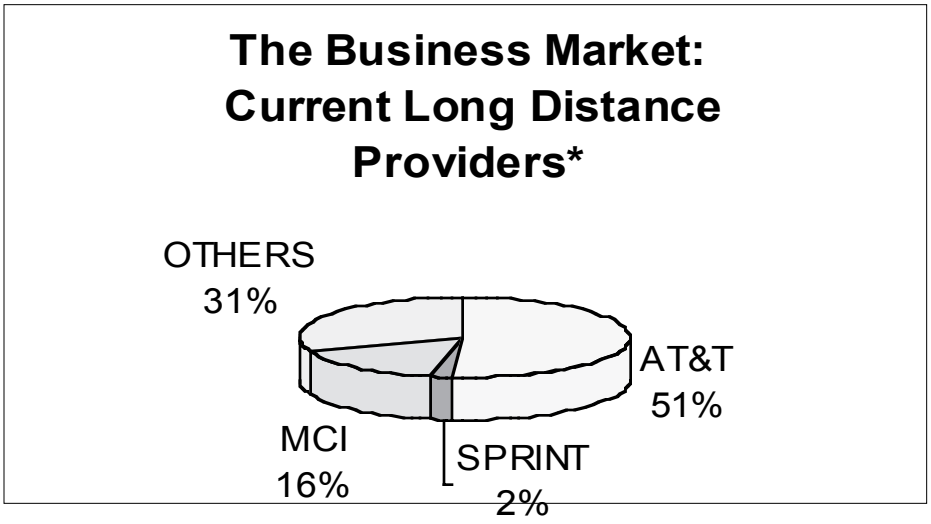


Table IV - **The Business Market: Would You Consider Changing Service Providers?** presents the results when businesses were asked if they would consider changing to another service provider supplying comparable service at less cost**.** The response was a clear "Yes" --- the greater the reduction, the greater willingness to consider change.

The Business Market*
Would You Consider Changing Service Providers?

	Level of Change							
	Likely						Not Likely	
	1	2	3	4	5	6	7	DonAt Know
Level of Cost Reduction								
Ten Percent (10%)	8%	3%	17%	19%	13%	10%	21%	10%
Twenty-five Percent (25%)	21%	23%	21%	18%	3%	3%	5%	7%
Fifty Percent (50%	66%	16%	5%	2%	0%	2%	2%	8%

* Based on data collected in the Summer of 1998

Table IV

What PC, Internet, and LAN services are available to employees now or will be in the near future? Table V - **The Business Market: Services Available to Employees** presents the responses to those questions. For example, in the average company surveyed, 22% of employees have computers at their workstations and in the next 2-5 years it is expected to reach 38% of employees.

The Business Market*
Services Available to Employees in the Median Ranked Company

Service	Now	2 - 5 Years
PC at work station	22% **	38% **
Internet connection	4% **	15% **
LAN connection	8%	22%

*Based on data collected in the Summer of 1998
** Percent of Employees

Table V

Table VI- **The Business Market: If Given a Choice, Would You Consider Switching?** asked if they would consider switching to new telecommunications providers if alternatives were available. Fewer than 25% said "no". The others said "yes' or a more conservative "don't know."

The Business Market*
If Given a Choice, Would you Consider Switching?

Service	Yes	No	Don't Know
Cable TV provider?	58%	11%	31%
Local phone provider?	41%	22%	37%
Point-to-point provider?	21%	12%	67%
Internet provider?	37%	23%	40%

*Based on data collected in the Summer of 1998

Table VI

The data in Table VI indicate a substantial percentage of businesses are willing to consider changing telecommunications providers. Table VII - **The Business Market: How Interested Would You Be If Additional Providers Offered the Following Services At Competitive Prices?** is intended to measure the strength of interest. The data reveal that a substantial majority responded toward the "very interested" end of the scale.

The Business Market*
What's Important in Meeting Future Needs?

Characteristics	Level of Importance: Very Important 1	2	3	4	5	6	Not Important 7
Quality of service	82%	16%	2%	0%	0%	0%	0%
Available bandwidth	41%	21%	16%	12%	2%	3%	5%
Customer billing/analysis	35%	20%	22%	13%	5%	3%	2%
High-speed communications	57%	33%	3%	2%	2%	2%	2%
Clarity of reception	72%	21%	3%	3%	0%	0%	0%
Price of installation	55%	23%	15%	7%	0%	2%	0%
Customer Service	69%	18%	11%	2%	0%	0%	0%
Technical Support	68%	16%	11%	5%	0%	0%	0%
Service reliability	82%	13%	2%	3%	0%	0%	0%
Multi-service discount	43%	23%	23%	8%	0%	3%	0%
Ease of use	53%	27%	14%	2%	2%	2%	0%
Variety of Services	44%	18%	25%	7%	3%	2%	2%

*Based on data collected in the Summer of 1998

Table VII

The data in Table VIII - **The Business Community: What's Important in Meeting Future Needs?** measure the importance assigned to various factors. It is clear that quality and reliability of service ranked highest. While important, the technical and cost criteria ranked as less important.

The Business Market*
How Interested Would You Be If Additional Providers Offered the Following Services At Competitive Prices?

	Level of Interest						
	Very Interested						Not Interested
Service	1	2	3	4	5	6	7
Long distance phone	24%	18%	18%	11%	14%	8%	8%
Cable TV	28%	16%	6%	6%	6%	10%	30%
Local phone	25%	22%	16%	14%	10%	6%	6%
Leased point-to-point	15%	12%	10%	8%	12%	12%	32%
High speed Internet	30%	20%	13%	7%	7%	7%	17%

* Based on data collected in the Summer of 1998

Table VIII

Focus groups and interviews revealed and reenforced the following:

- Significant enthusiasm for an expanded Central Virginia telecommunications system.
- An openness to consider nontraditional sources of services.
- Enthusiasm over the possibility of competition in areas where it does not now exist.
- The most often heard comment in both focus group and face-to-face interviews was that competition in the telecommunications industry will be good for their business --- Lynchburg businesses are anxious to see it become a reality.

D. The Education Sector

Lynchburg is a city rich in outstanding educational institutions at every level -- K - 12, two and four year colleges, and graduate programs. The public schools include twelve elementary schools, three middle schools, two comprehensive high schools, and an assortment of special schools and programs for selected groups of students. The public schools employee nearly 750 classroom teachers. This system which serves 9,500 students is regularly ranked among the best in the state and nation. The public school system is currently served by the City's fiber optics system.

During the summer of 1998 an interview with public school officials was held to discuss current and future uses of the emerging telecommunications system. The interview revealed that the public schools are already major users of the new fiber optics system and anticipate greater use in the future. The school system has more than 1,700 networked computers located in classrooms, laboratories, and offices. The Internet is rapidly becoming an integral part of the teaching/learning process. One of the middle schools currently has the capability to engage in real-time electronic field trips around the world. The fiber optics system will allow this experience to be easily and inexpensively made available to all schools.

Expanded uses in the near future includes but are not limited to individual school web sites that will include a wide array of information and materials and distance learning between schools to allow small enrollment classes to be offered in different schools at the same time.

The school officials also see expanded applications once the system links homes, businesses, and colleges. Links with homes will allow much greater contact and interaction between the teacher and parents. The parents will have an opportunity to become full partners along with student and teacher in the educational/learning process. Links to area colleges will allow advanced students to actually enroll in college classes without leaving the high school. The system will also allow the public schools to use the expertise of college faculty for the introduction of units of study in all subjects, i.e. a professor who is an expert on the civil war could easily introduce the subject to middle school students without leaving the college campus. Links to area businesses promise to greatly enhance the interaction between business and school allowing for new learning opportunities, work place education, and career development.

In addition to the public system, K - 12 students are served at two parochial schools -- Holy Cross Regional School and Lynchburg Christian Academy . Two residential middle/senior high schools are also located within the City and serve students from the City as well as across the state and nation --- Virginia Episcopal School and The Virginia School for the Arts. None of these schools are currently served by the fiber optics system and all are potential users.

The higher education community within the City of Lynchburg includes Central Virginia Community College, Lynchburg College, Randolph Macon Women's College, Liberty

University, and Virginia University of Lynchburg.. In addition, a number of colleges and universities located elsewhere offer courses within Lynchburg including the University of Virginia, Old Dominion University, and Averett College.

As would be expected, the higher education community is currently a major user of telecommunications technology and their utilization is expected to increase dramatically in the years ahead. None on these institutions are served by the City's telecommunications system requiring each to seek and maintain their own arrangements.

Interviews to explore interest in and future uses of an expanded telecommunications system were held with a sample of these major potential educational users. The interview with Lynchburg College officials revealed that the institution has invested major resources in telecommunications. The institution houses approximately 1,500 computers all networked and with internet connection. Distance learning opportunities with other colleges are in the discussion stages and would be enhanced with a link to the City's fiber optics system. Such a link would also allow Lynchburg College faculty to be in real-time contact with student teachers in the public school system and allow data transfer between faculty doing research for the schools and/or City.

An enthusiastic group of faculty and administrators at Central Virginia Community College shared their telecommunication needs and wants. They see a time in the near future when they will be able to offer home based instruction, link students in the classroom with professionals in the workplace, allow advanced placement high school students to take college courses without leaving the high school --- the list goes on. An expanded fiber optics system is a prerequisite for these innovations and they are anxious to see it happen.

One of the unique features about the dissemination of telecommunications information and applications is that it often involves children teaching adults rather than the more traditional path of adults to children. It is the child who comes home from school and shares new telecommunications experiences and makes requests for computers, E-mail, getting on the web, etc. The public school teacher is a vital player in creating this interest in telecommunications in children and promoting the expansion of telecommunications.

To measure the knowledge and use of telecommunications among the City of Lynchburg public school teachers and their enthusiasm for modern telecommunications, a survey of teachers was conducted in the summer of 1998. A questionnaire was distributed through the schools to all of the approximately 750 teachers. Participation in the survey was, of course, voluntary and produced 416 responses --- a return rate of over 55%. The responses proportionately represent K-12 teachers, all subjects, and all levels of teaching experience. Below is a summary of the results of that survey.

- 94.5% of the teachers were aware of the construction of the fiber optics telecommunications system.

- 94% indicated that they will make use of a networked system that connects homes, school, government offices, the Web, etc.
- 95% reported that they already have classroom access to a personal computer. (The remaining 5% are teachers without permanent classrooms such as art teachers)
- 96.4% reported that they already make use of the personal computer as a teaching aid or to prepare for class.
- 91% indicated that their classroom PC was connected to the Internet.
- 84% reported that they have access to a PC in their home.
- 77.5% of those with home computers have a modem.
- 64% reported subscribing to an Internet service.
- America On Line was by far the most popular Internet provider among teachers with 64% of the market. The remaining 36% were divided over at least six other providers.
- 30% answered "Yes" when asked if they would be willing to participate in focus groups and/or serve on local committees related to telecommunications. (The names are available)

The teachers were asked to anticipate and list the educational advantages of an expanded telecommunications system that reaches into homes and linked them with the classroom. The most frequent responses were:

- easier, quicker, and more frequent communication between teacher and parent
- homework and project assignments could be made on-line
- greater access to the internet for student projects and research
- teachers could communicate and share ideas more easily
- teachers who choose to work at home could do so more easily
- home bound students could keep up more easily
- an ill teacher could communicate a lesson plan to a substitute

- tutorials of all types could be available to students for enrichment as well as remedial work

- distance learning opportunities including multicultural contacts would be possible

- administrative work like the submission of grades and up dating student files would be made easier

- library materials could be accessed and even transferred to classroom or home

The above assessment of the Lynchburg educational community reveals wide spread interest in, use of, and enthusiasm for modern telecommunications. Decision makers in both the public and private educational arenas have committed many millions of dollars to bring to and keep area education at the frontier of educational telecommunications. The teacher survey clearly indicates that this involvement and enthusiasm is not limited to a small number of teachers or administrators but is pervasive throughout the educational community. With this level of commitment, involvement, and enthusiasm telecommunications has a bright future in the City of Lynchburg.

E. Health Care Sector

The quality and breadth of health care within Lynchburg and its MSA are ranked among the best in the State. One often cited reason is that physicians are attracted by the quality of life within the region and once here choose to stay. The hub of the health care industry is Centra Health, a nonprofit, locally owned and managed corporation. Centra Health has become one of the major employers within the region and, as might be expected, one of the largest potential users of an expanded telecommunications system.

To assess health care telecommunications uses, needs, and wants questionnaires were mailed to a sample of 155 physicians (59 were returned for a response rate of 38%) and 13 nursing homes (7 were returned for a response rate of 54%) Centra Health was not included in the survey. The results of the physician survey are summarized below.

Table IX - **The Physician Market: Current and Near Future Uses, Needs, and Wants** summarizes the status of telecommunications services among physicians. The data suggest that physicians are currently light to moderate users of available telecommunications but expect to significantly increase use in the next 2-5 years.

The Physician Market* Current and Near Future Uses, Needs, and Wants			
Services	**Currently Use**		**Expect to Use In 2 - 5 Years**
Local telephone	100%		100%
Cable TV Service	45%		46%
Cellular phone service	97%		93%
Internet access service	74%		81%
Internet on TV	3%		30%
Fax service	98%		92%
E-mail service	79%		73%
On-line banking	19%		45%
Remote diagnostics	12%		43%
Voice mail	55%		45%
A paging service	91%		88%
Satellite TV service	10%		26%
800 phone service	28%		32%
Telecommuting	18%		23%
Distance learning	23%		35%
Distance job training	17%		31%
Alarm/Security monitors	44%		46%
Data transfer	66%		76%
Teleradiology	19%		54%
Training & Certification	20%		39%
Research	41%		42%
Record Keeping	62%		61%
Mainframe access	51%		61%
Remote Consulting	12%		40%

*Based on data collected in the Summer of 1998

Table IX

Table X - **The Physician Market: Level of Satisfaction with the Quality of Service of Current Providers** presents physician responses when asked about the quality of current service. While there is a fairly high level of satisfaction, services paging, cellular, and Internet service got the lowest ratings.

Table X

The Physician Market*
Level of Satisfaction with the Quality of Service of Current Providers

	Level of Satisfaction							
	Satisfied							Dissatisfie
Type of Service	1	2	3	4	5	6	7	N/A
Local phone service	32%	42%	14%	10%	2%	0%	0%	0%
Long distance service	29%	44%	14%	10%	3%	0%	0%	0%
Cellular phone service	25%	34%	14%	14%	7%	5%	0%	2%
Paging service	7%	17%	14%	28%	26%	4%	2%	2%
Satellite service	2%	2%	2%	2%	0%	0%	2%	90%
Internet service	9%	14%	9%	23%	14%	4%	2%	26%

*Based on data collected in the Summer of 1998

The data in Table XI - **The Physician Market: Level of Satisfaction with Cost of Service of Current Providers** indicate that when asked about cost of service, physicians voiced a general expression of moderate dissatisfaction.

The Physician Market*
Level of Satisfaction with Cost of Service of Current Providers

Type of Service	Level of Satisfaction: Satisfied 1	2	3	4	5	6	Dissatisfied 7	N/A
Local phone service	11%	27%	23%	16%	18%	2%	4%	0%
Long distance phone service	14%	16%	27%	20%	20%	2%	2%	0%
Cellular phone service	13%	9%	30%	27%	11%	5%	4%	2%
Paging service	9%	9%	29%	18%	18%	11%	5%	2%
Satellite service	2%	4%	2%	4%	2%	0%	2%	82%
Internet service	12%	6%	15%	21%	10%	8%	0%	29%

* Based on data collected in the Summer of 1998

Table XI

If competition existed in the telecommunications market would physicians consider switching to alternative providers? Table XII - **The Physician Market: If Given a Choice, Would You Consider Switching?** Indicates a substantial interest in switching.

How strong is that interest in switching among physicians? The answer to that question is found in Table XIII - **The Physician Market: How Interested Would You Be If Additional Providers Offered the Following Services At Competitive Prices?** It can be seen that a substantial majority answered on the "very interested" end of the scale.

How important is cost as physicians consider whether or not to change providers? Table XVI - **The Physician Market: Would You Consider Changing Service Providers?** Indicates that cost is important --- the greater the reduction, the greater willingness to consider change.

The Physician Market*
If Given a Choice, Would you Consider Switching?

Service	Yes	No	Don't Know
Cable TV provider?	70%	4%	26%
Local phone provider?	35%	10%	55%
Internet provider?	50%	15%	35%

*Based on data collected in the Summer of 1998

Table XII

The Physician Market*
How Interested Would You Be If Additional Providers Offered the Following Services At Competitive Prices?

	Level of Interest						
	Very Interested						Not Interested
Service	1	2	3	4	5	6	7
Long distance phone	23%	25%	18%	19%	7%	7%	2%
Local phone	23%	26%	16%	21%	5%	7%	2%
High speed Internet	38%	18%	13%	15%	4%	6%	7%

* Based on data collected in the Summer of 1998

Table XIII

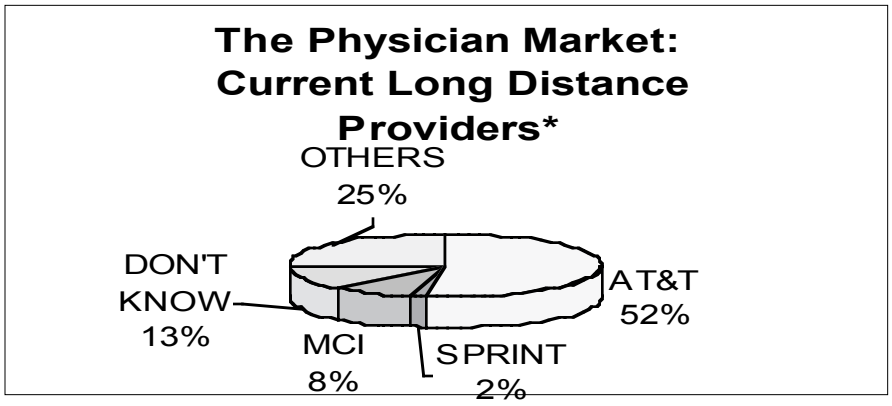
The Physician Market*
Would You Consider Changing Service Providers?

Level of Cost Reduction	Level of Change: Likely 1	2	3	4	5	6	Not Likely 7	DonAt Know
Ten Percent (10%)	69%	10%	19%	15%	10%	27%	4%	10%
Twenty-five Percent (25%)	35%	29%	7%	13%	7%	2%	0%	7%
Fifty Percent (50%	79%	10%	4%	2%	0%	0%	0%	7%

* Based on data collected in the Summer of 1998

Table XVI

Graph II - **The Physician Market: Current Long Distance Providers** clearly indicates that AT&T again claims the bulk of the long distance business with more than 50%.



Graph II

Table XV - **The Physician Market: What's Important in Meeting Future Needs?** indicates that as was the case within the business sector, quality and reliability of service are the most important criteria when evaluating telecommunication providers.

The Physician Market*
What's Important in Meeting Future Needs?

Characteristics	Level of Importance: Very Important 1	2	3	4	5	6	Not Important 7
Quality of service	81%	19%	0%	0%	0%	0%	0%
Available bandwidth	23%	17%	27%	20%	6%	4%	4%
Customized billing/analysis	18%	22%	33%	22%	2%	0%	4%
High-speed communications	47%	31%	13%	2%	2%	2%	4%
Clarity of reception	63%	34%	2%	0%	0%	0%	2%
Price of installation	47%	24%	18%	7%	0%	2%	2%
Customer Service	73%	14%	11%	2%	0%	0%	0%
Technical Support	71%	18%	9%	2%	0%	0%	0%
Service reliability	81%	16%	2%	2%	0%	0%	0%
Multi-service discount	35%	30%	28%	4%	2%	0%	2%
Ease of use	62%	29%	6%	2%	0%	0%	2%
Variety of Services	34%	28%	21%	13%	0%	2%	2%

*Based on data collected in the Summer of 1998

Table XV

The health care focus group was attended by physicians and institutional administrators. The participants were well informed and see great potential and a wide variety of applications for an expanded system. Among the insights expressed at the focus group was the belief that physicians and other health care professionals were not as informed about or using state-of-the-art telecommunications as the public might think. For physicians, like the rest of us, change is difficult.

F. The Household Sector

There are more than 27,000 families within the City and another 57,000 in the MSA --- a sizeable market for services if heads-of-households are ready, willing, and able. To assess the household market a random sample of 2,000 utility customers within the City was selected and surveyed. Six hundred questionnaires were returned for a response rate of 30% --- a remarkably high return rate for a cross-sectional sample of a general population. This high rate of return coupled with questionnaire comments and focus group discussion can be interpreted as an expression of strong interest and support for an expanded telecommunications system. More than 100 families volunteered to serve on focus groups or committees. Presented below are the data from the household survey.

Table XVI - **The Household Market: Current and Near Future Uses, Needs, and Wants** summarizes the telecommunications services currently used and anticipated in the near future. Highlights from the table have been singled out with bullets.

Table XVI

The Household Market*
Current and Near Future Uses, Needs, and Wants

Services	Currently Use		Expect to Use In 2 - 5 Years
Local telephone	100%		96%
Cable TV Service	88%		75%
Cellular phone service	56%		58%
Internet access service	50%		62%
Internet on TV	5%		22%
Fax service	30%		36%
E-mail service	48%		58%
On-line banking	14%		31%
On-line shopping	18%		26%
Voice mail	31%		38%
A paging service	19%		20%
Satellite TV service	7%		26%
800 phone service	21%		18%
Telecommuting	6%		14%
Distance learning	5%		18%
Distance job training	3%		12%
Alarm/Security monitors	11%		25%

*Based on data collected in the Summer of 1998

- 88% of households currently subscribe to the cable TV service.
- 50% of households have Internet service and the number is expected to reach 62% within 2-5 years.
- 56% of households currently subscribe to a cellular phone service.
- Only 14% of households currently use on-line banking but 31% expect to within 2-5 years.
- Only 11% of households currently use alarm or security monitors but 25% expect to within 2-5 years.

Table XVII - **The Household Market: Level of Satisfaction with the Quality of Service of Current Providers** presents responses from heads-of-households when asked about satisfaction with the quality of services. While the level of satisfaction is moderately high, the greatest dissatisfaction was with cable TV followed by Internet service**.**

Table XVII

Table XVIII - **The Household Market: Level of Satisfaction with Cost of Services of Current Providers** presents heads-of-household response when asked about satisfaction with the cost of services. Heads-of-households expressed a general dissatisfaction, with cable TV leading the list.

The Household Market*
Level of Satisfaction with the Quality of Service of Current Providers

Type of Service	Level of Satisfaction: Satisfied 1	2	3	4	5	6	Dissatisfied 7	N/A
Local phone service	54%	21%	13%	7%	3%	0%	1%	0%
Long distance phone ser	49%	23%	13%	7%	2%	2%	2%	1%
Cellular phone service	19%	12%	9%	7%	3%	1%	2%	47%
Paging service	7%	6%	2%	2%	1%	1%	1%	80%
Satellite service	3%	2%	1%	1%	0%	0%	1%	92%
Cable TV service	15%	11%	15%	17%	12%	9%	7%	13%
Internet service	13%	13%	12%	7%	2%	2%	1%	51%

*Based on data collected in the Summer of 1998

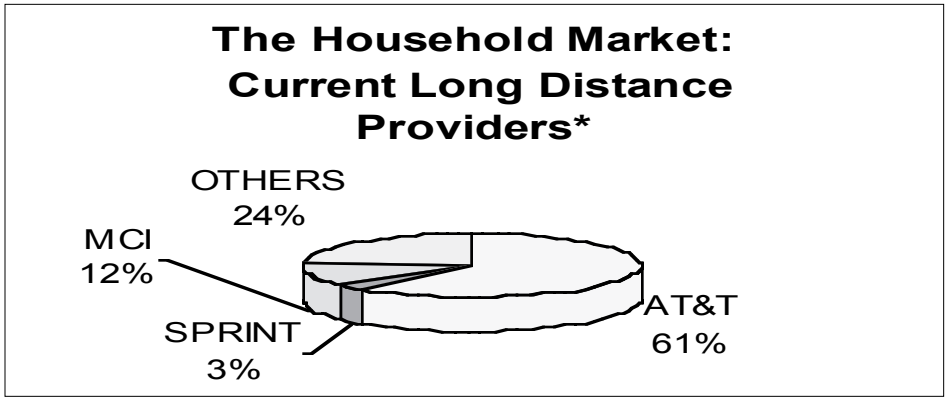
Table XVIII

Graph III - **The Household Market: Current Long Distance Providers** clearly indicates that AT&T claims the lion's share of the market --- over 60% of the households.

The Household Market*
Level of Satisfaction with Cost of Service of Current Providers

Type of Service	Level of Satisfaction: Satisfied 1	2	3	4	5	6	Dissatisfied 7	N/A
Local phone service	29%	20%	20%	13%	10%	5%	4%	0%
Long distance phone service	29%	23%	20%	13%	6%	4%	4%	0%
Cellular phone service	10%	9%	13%	11%	5%	3%	3%	47%
Paging service	5%	4%	5%	3%	0%	0%	0%	83%
Satellite service	1%	1%	1%	1%	0%	0%	1%	94%
Cable TV service	9%	6%	11%	15%	11%	13%	22%	14%
Internet service	9%	9%	13%	10%	4%	1%	1%	52%

*Based on data collected in the Summer of 1998



Graph III